APPENDIX G

Soils Association Descriptions

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SITKA SPRUCE BELT (MLRA-4A) – MPs 1.47R TO 19.22

The Sitka Spruce Belt is a relatively long and narrow zone running north-south along the coast. In the project area, it includes the greater Coos Bay area and the hills and valleys just to the east and south. Most of this part of the Major Land Resource Area (MLRA) has an elevation of 50 to 300 feet. The coastal area around the mouth of floodplains along the major rivers near the coast is flat, but inland areas are very hilly. The area is highly dissected by numerous perennial rivers and creeks which commonly flow into estuaries. The average annual precipitation is 50 to 90 inches. Precipitation is evenly distributed throughout fall, winter, and spring, but summers are cool and dry. Snowfall accumulation is rare. This area lies within the coastal fog belt zone, and heavy fogs are common in summer. The average annual temperature is 45 to 55 degrees Fahrenheit (°F). The freeze-free period ranges from 220 to 365 days in most of this area. Most of MLRA 4A near the project area consists of privately owned residential land, small farms and ranches, or forests. Timber production is the major industry (NRCS 2006). The two major soils associations crossed by the project in this MLRA are described below.

Nehalem-Duneland-Bullards (s6398)

The Nehalem-Duneland-Bullards soil association is crossed by 1.2 percent of the pipeline route length. The dominant soil mapping units which are crossed by the Project in soils association s6398 are: Coquille silt loam (map unit 12, 1.75 miles); Templeton silt loam, 30 to 50 percent slopes (map unit 54E, 0.42 mile); and Templeton silt loam, 0 to 30 percent slopes (map unit 54D, 0.30 mile). Five other soil mapping units are crossed by the Pacific Connector pipeline with individual crossing lengths ranging from 0.02 to 0.13 mile.

Coquille soils are susceptible to soil compaction, have a year-round high water table (0 to greater than 6 feet deep), are a hydric soil and prime farmland (farmland of statewide importance). Templeton soils have a paralithic contact with siltstone between 40 and 60 inches deep and are susceptible to soil compaction. Templeton silt loam has steep slopes (30 to 50 percent) which makes it susceptible to water erosion and gives it a potential for reclamation sensitivity. The mean annual precipitation in this soil association is 70 to 90 inches.

Tolovana-Templeton-Salander-Reedsport-Fendall (s6399)

The Tolovana-Templeton-Salander-Reedsport-Fendall soil association is crossed by 7.1 percent of the pipeline route length. The dominant soil mapping units which are crossed by the Project in soils association s6399 are: Geisel silt loam, 12 to 30 percent slopes (map unit 26D, 2.56 miles); Preacher-Bohannon loams, 30 to 60 percent slopes (map unit 46E, 2.05 miles); Templeton silt loam, 30 to 50 percent slopes (map unit 54E, 0.77 miles); and Templeton silt loam, 0 to 30 percent slopes (map unit 54D, 0.86 mile). Fifteen other soil mapping units are crossed by the Project with individual crossing lengths ranging from 0.04 to 0.56 mile. All of the soil map units crossed in this soils association are susceptible to soil compaction. Geisel soils have a paralithic contact with siltstone at 40 to 60 inches which rates them as having reclamation sensitivity. The Geisel soil map unit is designated as a farmland of statewide importance. Preacher-Bohannon loams are susceptible to water erosion due to the steep slopes and are

designated as having a reclamation sensitivity rating. Templeton soils have a paralithic contact with siltstone between 40 and 60 inches deep and a reclamation sensitivity potential. Templeton silt loam has steep slopes (30 to 50 percent) which makes it susceptible to water erosion and gives it a potential for reclamation sensitivity. The mean annual precipitation in this soil association is 65 to 80 inches.

NORTHERN PACIFIC COAST RANGE, FOOTHILLS, AND VALLEYS (MLRA-1) – MPs 19.22 TO 47.16

The North Pacific Coast Range, Foothills and Valleys MLRA encompasses the Coast Range of Oregon in the project area, which is centered about on the Coos and Douglas County line. Most of the MLRA consists of hills and low mountains with gentle to steep slopes. Elevations near the project area range from 300 to almost 3,000 feet. The valleys are mostly narrow and of small extent. The MLRA receives an average annual precipitation of 60 to 100 inches, which is evenly distributed throughout fall, winter, and spring. Summers are usually dry and warm, but hot days are rare. Winters are cool and snow and freezing temperatures are common only at higher elevations. In most of this area, snow falls only a few days each year. The average annual temperature is 40 to 55°F. The average freeze-free period in this area ranges between 150 to 280 days and decreases with elevation. Most of the area is densely forested, and timber production is the major industry. Recreation and wildlife habitat also are important land uses (NRCS 2006). The major soil resource concerns are water erosion due to steep slopes, erodible soils and high rainfall. The erosion hazard is considerable if plant cover is removed. Surface compaction and sedimentation of streams are also soil resource concerns. Mass movement in the form of landslides and slips is a serious problem and a major source of sediment in the rivers. The three soils associations crossed by the project area are described below.

Peavine-Olyic-Melby-Honeygrove-Blachly (s6396)

The Peavine-Olvic-Melby-Honeygrove-Blachly soil association is crossed by 4.5 percent of the pipeline route length. The dominant soil mapping units which are crossed by the Project in soils association s6396 are: Honeygrove silty clay loam, 30 to 50 percent slopes (map unit 30E, 3.17 miles); Honeygrove silty clay loam, 3 to 30 percent slopes (map unit 30D, 2.62 miles); Preacher-Blachly association, 12 to 30 percent slopes (map unit 44D, 1.45 miles); and Preacher-Blachly association, 30 to 60 percent slopes (map unit 44E, 1.33 miles). All of the soil map units crossed in this soils association are susceptible to soil compaction. Honeygrove and Blachly soils have greater than 40 percent clay in the control section which classifies them as having a reclamation sensitivity rating. Map units 30 E and 44E have slopes greater than 30 percent which increases water erosion potential and rates them as having reclamation sensitivity. Landforms are typified by uneven, step-like benches caused by sliding and slumping. The mean annual precipitation ranges from about 75 to 100 inches.

Nekoma-Meda-Kirkendall-Eilertsen (s6402)

The Nekoma-Meda-Kirkendall-Eilertsen soil association is crossed by 0.9 percent of the pipeline route length. The dominant soil mapping units which are crossed by the proposed Project in soils association s6402 are: Chismore silt loam, 3 to 7 percent slopes (map unit 10B, 0.79 mile); and Pyburn silty clay, 0 to 8 percent slopes (map unit 47B, 0.28 mile). Soils in both map units are prime farmland (farmland of statewide importance). Pyburn soils have greater than 40

percent clay in the control section which causes these soils have a reclamation sensitivity rating. Pyburn soils are hydric soils. Chismore soils have a high water table from November through March that ranges in depth from 1.5 to greater than 6.0 feet. Pyburn soils have a high water table from October through May that ranges from the surface to greater than 6.0 feet. The average annual precipitation of this association is about 75 inches.

Bohannon-Preacher (s6395)

The Bohannon-Preacher association (s6395) is crossed by the Pacific Connector pipeline in both Coos (14.38 miles) and Douglas (1.49 miles) Counties (7.0 percent of the pipeline route length). The mean annual precipitation is 80 to 95 inches. The dominant soil mapping units which are crossed by the proposed Project in soils association s6395 are: Preacher-Bohannon loams, 3 to 30 percent slopes (map unit 46D, 2.72 miles); Preacher-Blachly-Digger association, 30 to 60 percent slopes (map unit 45E, 2.43 miles); Preacher-Blachly association, 12 to 30 percent slopes (map unit 44D, 1.57 miles); Remote-Digger-Preacher complex, 30 to 50 percent slopes (map unit 50E, 1.56 miles). Ten other soil map units are crossed in this association with individual lengths ranging from 0.05 to 1.10 miles with similar soils and varying slope ranges. All of the dominant soil map units in this association are susceptible to soil compaction. Preacher-Blachly-Digger (45E) and Remote-Digger-Preacher (50E) have steep slopes that increase the potential for water erosion. Remote-Digger-Preacher (50E) is characterized by large stones. Preacher-Bohannon (46D), Preacher-Blachly-Digger (45E), and Remote-Digger-Preacher soil map units have a paralithic contact with sandstone within 20 to 60 inches, and have a potential for reclamation sensitivity.

The dominant soil mapping unit from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) which is crossed by the proposed Pacific Connector pipeline in soils association OR068 is Digger-Bohannon complex, 3 to 30 percent slopes (map unit 57E, 0.95 mile). Soils in this map unit are limited by large stones and are susceptible to compaction. The revegetation potential is low.

Siskiyou-Trinity Area (MLRA-5) – MPs 47.16 to 168.0

Siskiyou-Trinity Area is the largest MLRA crossed by the Project and it encompasses the three national forests (Umpqua, Rogue River-Siskiyou and portions of the Fremont-Winema), spanning portions of the Klamath Mountain and Cascade west physiographic provinces (crossing 1.8 percent of the pipeline route length). The Siskiyou-Trinity Area receives an average annual precipitation of 40 to 60 inches, with the high precipitation ranges occurring in the mountains. Precipitation is low in summer but is evenly distributed throughout the rest of the year. Summers are warm with an average temperature of 67°F. Winters are cool with snow and freezing temperatures common at higher elevations. The average seasonal snowfall ranges from 10 to 70 inches, varying dramatically depending on the year. During most winters, one or two storms bring strong and sometimes damaging winds. In some years, the accompanying heavy rains cause serious flooding (NRCS 2006).

The Pacific Connector pipeline will cross through the northern section of MLRA-5, crossing on the west the Klamath Mountains section of the Pacific Border Province of the Pacific Mountain System between Highway 42 near Camas Valley (MP 47.16) and Highway 62 near Trail Oregon (MP 122.6). This section consists of an uplifted and eroded peneplain on very hard rocks.

Numerous higher peaks are in scattered areas throughout this mountainous region. The Middle Cascade Mountains Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System is also crossed within this MLRA-5 between about Highway 62 near Trail Oregon (MP 122.6) and Dead Indian Memorial Highway (MP 164.48). This section is an area of steep mountainous terrain with generally accordant summits interspersed with higher volcanic cones (NRCS 2006).

Elevation in the project area ranges from about 600 feet at the Umpqua River crossing north of Myrtle Creek to 5,300 feet at the crest of the Cascades. The freeze-free period averages 240 days and ranges from 110 to 365 days. Shorter freeze-free periods occur at the higher elevations. Most of this area is in coniferous forests that are important for wood products, wildlife habitat and recreation. Irrigated pasture, hay crops and livestock are grown in the valleys where water is available. Because of steep slopes, erodible soils and high rainfall, the major soil resource concern is erosion. The erosion hazard is considerable if plant cover is removed. Mass movement in the form of landslides and slips is a serious problem and a major source of sediment in the rivers (NRCS 2006).

The 13 soil associations crossed by the project within MLRA-5 are described below.

Windygap-Larmine-Bellpine-Bateman-Atring (s6410)

The Windygap-Larmine-Bellpine-Bateman-Atring soil association is crossed by 1.8 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the Pacific Connector pipeline in soils association s6410 are: Windygap clay loam, 12 to 30 percent slopes (map unit 263E, 0.83 mile); Windygap clay loam, 2 to 12 percent slopes (map unit 263C, 0.71 mile); and McNabb-Windygap complex, 3 to 30 percent slopes (map unit 152E, 0.66 mile). All three of these soil map units are characterized by large stones, greater than 40 percent clay in the control section, and are susceptible to soil compaction, which rates them as having reclamation sensitivity potential. However, these soils are also designated as prime farmlands. Twelve other soil map units are crossed by the PCGP Project within this association with individual lengths ranging from 0.03 to 0.48 mile. The mean annual precipitation of this association is about 45 to 50 inches. Slopes are 2 to 75 percent.

Wapato-Waldo-McAlpin-Cove-Bashaw (s6408)

The Wapato-Waldo-McAlpin-Cove-Bashaw soil association is crossed by 2.0 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the Pacific Connector pipeline in soils association s6408 are: Windygap clay loam, 2 to 12 percent slopes (map unit 263C, 0.54 mile); Windygap clay loam, 12 to 30 percent slopes (map unit 263E, 0.54 mile); and Windygap silt loam, 12 to 30 percent slopes (map unit 262E, 0.52 mile). Sixteen other soil map units are crossed within this association ranging in individual length from 0.03 to 0.32 mile. These soils are characterized by a paralithic contact with weathered siltstone within 40 to 60 inches, greater than 40 percent clay in the control section, and are susceptible to compaction.

These characteristics rate these soils as having reclamation sensitivity potential. However, each of these dominant soil map units is listed as prime farmland. The mean annual precipitation is about 45 to 50 inches.

Otwin-Oatman (s6397)

The Otwin-Oatman soil association is crossed by 1.4 percent of the pipeline route length in this MLRA (it is also crossed in another MLRA). The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the proposed Pacific Connector pipeline in soils association s6397 are: Conser silty clay loam, 0 to 3 percent slopes (map unit 44A, 0.61 mile); Veneta loam, 0 to 12 percent slopes (map unit 255C, 0.56 mile); Josephine-Speaker complex, 30 to 60 percent slopes (map unit 117F, 0.38 mile); and Windygap-Bellpine complex, 30 to 60 percent north slopes (map unit 265F, 0.34 mile). Twelve other soil map units are crossed within this association with individual lengths ranging from 0.04 to 0.25 mile.

The Conser, Veneta, and Windygap-Bellpine map units have greater than 40 percent clay in the control section, are susceptible to soil compaction, and have reclamation sensitivity potential. Conser soils are hydric and have a water table within 6 feet of the surface from November through May. The Veneta soil has a water table within 4 to 6 feet of the surface from November through May. Conser and Veneta soils are listed as prime farmland. The Josephine-Speaker complex and Windygap-Bellpine complex are characterized by steep slopes which increase the water erosion potential, have a paralithic contact with weathered sandstone or metasedimentary rock within 20 to 60 inches, are susceptible to soil compaction, and have a reclamation sensitivity rating. The mean annual precipitation is about 40 inches.

Vermisa-Vannoy-Josephine-Beekman (s6360)

The Vermisa-Vannoy-Josephine-Beekman soil association is crossed by 13.1 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the proposed Pacific Connector pipeline in soils association s6360 in MLRA 2 are: Speaker-Beekman-Josephine complex, 60 to 90 percent north slopes (map unit 228G, 1.26 miles); Josephine-Speaker complex, 30 to 60 percent north slopes (map unit 116F, 1.68 miles); Speaker-Nonpareil complex, 30 to 60 percent slopes (map unit 230F, 1.08 miles); Debenger-Brader complex, 12 to 30 percent slopes (map unit 51E, 0.80 mile); Oakland-Nonpareil-Sutherlin complex, 30 to 60 percent slopes (map unit 174F, 0.78 mile); and Speaker loam, 30 to 60 percent south slopes (map unit 227F, 0.72 mile). Twenty seven other soil map units are crossed by this association with individual lengths ranging from 0.01 to 0.62 mile. All of the dominant soil map units are susceptible to soil compaction and have a reclamation sensitivity rating.

The Speaker-Beekman-Josephine, Josephine-Speaker, Speaker-Nonpareil, Oakland-Nonpareil-Sutherlin, and Speaker loam map units have steep slopes and water erosion potential. Beekman soils have a lithic contact with sedimentary rock at 20 to 40 inches. Brader and Nonpareil and soils have a paralithic contact with weathered sandstone at 10 to 20 inches. Debenger, Oakland, and Speaker soils have a paralithic contact with weathered sandstone at 20 to 40 inches. Josephine soils have a paralithic contact with weathered metasedimentary rock at 40 to 60 inches. Sutherlin soils are very deep and have a water table at 1.5 to 3.0 feet from November

through April. The Debenger-Brader complex map unit is listed as prime farmland (farmland of statewide importance).

Ruch-Medford (s6385)

The Ruch-Medford soil association is crossed by 36.0 percent of the pipeline route length in this MLRA. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the proposed Pacific Connector pipeline in soils association s6385 are: Sutherline silt loam, 3 to 12 percent slopes (map unit 235C, 0.39 mile); Coburg silty clay loam, 0 to 5 percent slopes (map unit 42B, 0.27 mile); and Fordice very cobbly loam, 0 to 12 percent slopes (map unit 82C, 0.19 mile). Six other soil map units are crossed within this association with individual lengths ranging from 0.04 to 0.09 mile. Sutherlin and Coburg soils have greater than 40 percent clay in the control section, are susceptible to soil compaction, and are listed as prime farmland. However, because of the high clay content and the soils susceptibility to compaction these soils have a reclamation sensitivity rating. Sutherlin soils have a water table at 1.5 to 3.0 feet from November through April. Coburg soils have a water table at 1.5 to greater than 6 feet from November through May. Fordice soils have large stones, giving this soil a reclamation sensitivity rating. The mean annual precipitation of the association ranges between 25 and 40 inches.

Lettia-Kanid-Atring-Acker (s6382)

The Lettia-Kanid-Atring-Acker soil association is crossed by 3.4 percent of the pipeline route length. This STATSGO soil association occurs in both the Douglas County Soil Survey Area and in the Umpqua National Forest Soil Resource Inventory. The average annual precipitation is about 45 inches. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the Pacific Connector pipeline in soils association s6382 are: Acker-Norling complex, 30 to 60 percent north slopes (map unit 5F, 0.94 mile); Dumont gravelly loam, 12 to 30 percent slopes (map unit 69E, 0.78 mile); Sharpshooter loam, 30 to 60 percent north slopes (map unit 220F, 0.47 mile); Sweetbriar silty clay loam, 3 to 30 percent slopes (map unit 239E, 0.44 mile); and Buckeye loam, 2 to 20 percent slopes (map unit 30D, 0.43 mile). Thirteen other soil map units are crossed in this association with individual lengths ranging from 0.01 to 0.38 mile.

All of the dominant soil map units are susceptible to soil compaction. Acker-Norling map unit is characterized by steep slopes that increase the water erosion potential, large stones, a paralithic contact with metavolcanic rock at 20 to 60 inches, and reclamation sensitivity potential. Dumont soils have greater than 40 percent clay in the control section, a reclamation sensitivity characteristic. Sharpshooter soils have steep slopes that increase the water erosion potential, a paralithic contact with schist at 40 to 60 inches; and a reclamation sensitivity rating. Sweetbriar soils have greater than 40 percent clay in the control section and reclamation sensitivity potential. Buckeye soils have a lithic contact with greenstone at 20 to 40 inches, greater than 40 percent clay in the control section, providing a reclamation sensitivity rating. Dumont, Sweetbriar, and Buckeye soils are prime farmland (farmland of statewide importance).

The dominant soil mapping units from the Soil Resource Inventory of Umpqua National Forest, Oregon (Forest Service 1976) crossed by the proposed Pacific Connector pipeline in soils association s6382 are: map unit 712 (0.23 mile); map unit 62 (0.47 mile); and map unit 25 (0.42

mile). Six other soil map units are crossed in this association with individual lengths ranging from 0.01 to 0.23 mile. Map unit 47 is characterized by steep slopes, large stones, a lithic contact with tuffs and breccia at 3 to 8 feet, susceptibility to compaction, and a reclamation sensitivity rating. Map unit 62 is characterized by steep slopes, wind and water erosion potential, a lithic contact with granite at 3 to 6 feet, susceptible to soil compaction, and is rated as having reclamation sensitivity. Map unit 25 is characterized by landslides on steep slopes, hydric soils and water tables associated with sag ponds, and landslides with reclamation sensitivity.

Rock outcrop-Pearsoll-Dubakella-Cornutt (s6377)

The Rock outcrop-Pearsoll-Dubakella-Cornutt soil association is crossed by 0.5 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Douglas County Area, Oregon (NRCS 2004) crossed by the proposed Pacific Connector pipeline in soils association s6377 are: Hilltish very gravelly sandy loam, 60 to 90 percent north slopes (map unit 95G, 0.57 mile); and Hilltish very gravelly sandy loam, 60 to 90 percent south slopes (map unit 96G, 0.29 mile). Four other soil map units are crossed within this association with individual lengths ranging from 0.01 to 0.14 mile. Hilltish soils are characterized by steep slopes that increase the potential for water erosion, large stones, a lithic contact with conglomerate at 20 to 40 inches, susceptibility to soil compaction, and a reclamation sensitivity rating. The mean annual precipitation of the association is about 30 inches.

Tethrick-Tallowbox-Siskyou-Shefflein (s6383)

This STATSGO soil association occurs in both the Douglas County Soil Survey Area and in the Umpqua National Forest Soil Resource Inventory; and is crossed by 3.6 percent of the pipeline route length. The annual precipitation is 32 to 45 inches. The dominant soil mapping units from the Soil Survey of Douglas County are: Lettia-Beal-Zing complex, 30 to 60 percent south slopes (map unit 138F, 1.57 miles); Sharpshooter loam, 30 to 60 percent south slopes (map unit 221F, 0.47 mile); Lettia-Beal-Zing complex, 30 to 60 percent north slopes (map unit 137F, 0.39 mile); and Acker-Norling complex, 30 to 60 percent south slopes (map unit 6F, 0.36 mile). Six other soil map units are crossed within this association with individual lengths ranging from 0.06 to 0.26 mile. All of the dominant soil map units have steep slopes that lead to severe water erosion potential, susceptibility to soil compaction and reclamation sensitivity potential. Lettia soils have a paralithic contact with granodiorite at 40 to 60 inches. Sharpshooter soils have a paralithic contact with weathered schist at 40 to 60 inches. Norling soils have a paralithic contact with metavolcanic rock at 20 to 40 inches.

Beal and Zing soils have a water table from 2 to greater than 6 feet from November through May. The dominant soil mapping units from the Soil Resource Inventory of Umpqua National Forest, Oregon (USFS 1976) crossed by the proposed Project in soils association s6383 are: map unit 812 (2.16 miles); and map unit 621 (1.32 mile). Three other soil map units are crossed within this association with individual lengths ranging from 0.17 to 0.20 mile. Both of the dominant soil map units have steep slopes, are susceptible to wind and water erosion, have large stones, and have reclamation sensitivity potential. Map unit 812 has a lithic contact with serpentine at 3 to 6 feet. Map unit 621 has a lithic contact with granite at 3 to 8 feet.

Thistleburn-Telemon-Scaredman-Mellowmoon-Lempira-Illahee (s6390)

The dominant soil mapping units from the Soil Resource Inventory of Umpqua National Forest, Oregon (Forest Service 1976) crossed by the Pacific Connector pipeline in soils association s6390 are: map unit 723 (1.98 miles); map unit 712 (1.07 miles); and map unit 421 (0.78 mile) (crossed by 2.2 percent of the pipeline route length). Four other soil map units are crossed within this association with individual lengths ranging from 0.15 to 0.46 mile. Each of the dominant map units have steep slopes, large stones, and are susceptible to soil compaction. Map unit 723 has a lithic contact with schist at 3 to 6 feet. Map unit 712 has a lithic contact with schist at 3 to 8 feet. Map unit 621 has a lithic contact with tuffs at 3 to 8 feet. The mean annual precipitation is 60 to 70 inches.

Straight-Geppert-Freezener-Dumont (s6381)

This STATSGO soil association occurs in both the Jackson County Soil Survey Area and in the Umpqua National Forest Soil Resource Inventory (crossed by 2.6 percent of the pipeline route length). The mean annual precipitation ranges from 43 to 50 inches. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the Pacific Connector pipeline in soils association s6381 are: McNull loam, 12 to 35 percent north slopes (map unit 114E, 0.68 mile); Straight extremely gravelly loam, 12 to 35 percent north slopes (map unit 182E, 0.62 mile); Freezner gravelly loam, 12 to 35 percent slopes (map unit 64E, 0.56 mile); and McNull loam, 35 to 60 percent north slopes (map unit 114G, 0.53 mile). Twelve other soil map units are crossed within this association with individual lengths ranging from 0.02 to 0.48 mile. Each of the dominant soil map units has steep slopes, is susceptible to soil compaction, and has a reclamation sensitivity rating. McNull and Straight soils have a lithic contact with andesite at 20 to 40 inches. McNull soils in map unit 114G are susceptible to water erosion. The Straight soil is hydric. The Freezner soil is prime farmland (farmland of statewide importance).

The dominant soil mapping unit from the Soil Resource Inventory of Umpqua National Forest, Oregon (Forest Service 1976) crossed by the proposed Project in soils association s6381 is map unit 222 (1.14 miles). Map units 421 (0.27 mile) and 42 (0.01 mile) are also crossed within this association. Map unit 222 has steep slopes, a lithic contact with tuffs and breccia at 3 to 8 feet and a reclamation sensitivity rating.

McNull-Medco-McMullin (s6380 and s6386)

The McNull-Medco-McMullin soil association is crossed by 15.5 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the Pacific Connector pipeline in soils association s6380 and s6386 are: Medco-McMullin complex, 12 to 50 percent slopes (map unit 125F, 4.04 miles); McMullin-Rock Outcrop, 3 to 35 percent slopes (map unit 113E, 3.95 miles); McMullin-McNull gravelly loams, 35 to 60 percent slopes (map unit 111G, 2.65 miles); Mcmullin-Medco Complex, 15-50 percent slopes (map unit 112F, 2.05 miles); McNull loam, 12 to 35 percent north slopes (map unit 114E, 2.24 miles); and McNull-Medco complex, 12 to 50 percent slopes (map unit 118E, 2.37 miles). Thirty-four other map units are crossed within this association with individual lengths ranging from 0.06 to 1.88 miles. Each of the dominant soil map units has steep slopes, is susceptible to soil compaction, and has reclamation sensitivity potential. McNull, Medco, and Carney soils have greater than 40 percent clay in the control section. McNull and Medco soils

have large stones. Carney soils have a paralithic contact with weathered sandstone at 20 to 40 inches. McMullin soils have a lithic contact at 12 to 20 inches. McNull soils have a lithic contact with fractured andesite at 12 to 20 inches. McNull soils have a paralithic contact with fractured andesite at 20 to 40 inches. Medco soils have a paralithic contact with weathered tuff at 20 to 40 inches. Medco soils have a water table at 0.5 to 1.6 feet from December through March. Carney soils have a water table at 3 to 3.5 feet from December through April. Carney soils are prime farmland (farmland of statewide importance). This association has a mean annual precipitation of about 30 to 35 inches.

Tatouche-Pinehurst-Farva-Bybee Farva-Tatouche-Bybee (s6384)

This STATSGO soil association occurs in both the Jackson County Soil Survey Area and in the Rogue River-Siskiyou National Forest (crossed by 5.9 percent of the pipeline route length). The mean annual precipitation ranges from 40 to 43 inches. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the Pacific Connector pipeline in soils association s6384 are Farva very cobbly loam, 3 to 12 percent slopes (map unit 56C, 0.73 mile); Tatouche gravelly loam 12 to 35 percent slopes (map unit 191 E, 0.52 mile); Farva very cobbly loam, 35 to 65 percent slopes (map unit 57G, 0.65 mile); Farva very cobbly loam, 12 to 35 percent slopes (map unit 57E, 0.43 mile); and Freezner gravelly loam, 12 to 35 percent slopes (map unit 64E, 0.43 mile). Four other map units are crossed within this association with individual lengths ranging from 0.05 to 0.33 mile. Farva soils have large stones, a paralithic contact with partially weathered andesite at 20 to 40 inches, and have reclamation sensitivity potential. Farva soils in map units 57E and 57G have steep slopes. Farva soils in map unit 57G have potential for water erosion due to the steep slopes. Freezner soils have steep slopes, are susceptible to compaction, and thus are rated as having reclamation sensitivity, but are considered farmlands of statewide importance.

The following STATSGO description for soil association s6384 is provided for areas crossed by the PCGP Project within the Rogue River-Siskiyou National Forest between MPs 158.30 and 168.0 (9.7 miles). In this area the Rogue River National Forest Soil Resource Inventory was used to characterize soil properties (Forest Service 1977). The Farva series consists of moderately deep, well drained soils formed in colluvium weathered from andesite, tuffs, basalts and breccias found on mountains at 3,600 to 6,100 feet. The Tatouche series consists of deep, well-drained soils that formed in clayey colluvium weathered from tuff, breccia, and andesite. Tatouche soils are on mountain slopes. The Bybee series consists of deep, somewhat poorly drained soils that formed in clayey colluvium weathered from andesite, volcanic tuffs and breccias. Bybee soils are found on mountains. The mean annual precipitation is about 40 to 43 inches, on slopes of 3 to 70 percent.

Klamath and Shasta Valleys and Basins (MLRA-21) – MPs 168.0 to 228.13

The proposed pipeline passes through the Klamath and Shasta Valleys and Basins MLRA on the east side of the Cascade Mountains in the Klamath Basin. Most of this section of the project area is approximately 4,000 feet in elevation. As described by NRCS (2006), this area is in a transition zone between the Basin and Range Province to the southeast and the Cascades and Klamath Basins to the west. The area receives an average annual precipitation of 20 to 30 inches, with dry summers. Average temperature for summer is in the mid 60 degrees F range. The winter is in the mid-50°F range. Snowfall accounts for 30 percent of the moisture in the

valleys. Average freeze-free period is 70 to 140 days, decreasing with elevation. Most of the land crossed in the Klamath Basin is in agricultural production including irrigated potatoes, grain, seed crops, hay or pastures. Rangelands are grazed and trees are harvested for lumber in forested areas. The major soil resource concerns are wind erosion, water erosion, maintenance of productivity of the soils, conservation of soil moisture and the quality of irrigation water. The hazard of water erosion is slight in most of the basin areas but can be high in the steeper areas if the surface is bare. In some areas where soils are coarsely textured the hazard of wind erosion can be high, especially when the surface is disturbed during the period of highest wind velocities typically in spring or early summer (NRCS 2006). The eight soil associations crossed in this MLRA are summarized below.

Oatman-Otwin (s6387)

The Oatman-Otwin soil association is crossed by 2.9 percent of the pipeline route length in this MLRA (it is also crossed in another MLRA). This STATSGO soil association occurs in both the Jackson County Soil Survey Area and in the Fremont-Winema National Forest in Klamath County. The mean annual precipitation for this association ranges between 35 and 40 inches. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the proposed Pacific Connector pipeline in soils association s6387 is: Oatman cobbly loam, depressional, 0 to 12 percent slopes (map unit 137C, 2.96 miles); Two other soil map units are crossed in this association with individual lengths of 0.12 and 0.05 mile. Oatman soil has large stones, is susceptible to soil compaction, and has a reclamation sensitivity potential.

The following STATSGO description for soil association s6387 is provided for areas crossed by the Pacific Connector pipeline within the Fremont-Winema National Forest between MPs 168.00 and 171.6 (3.6 miles). In this area the Winema National Forest Soil Resource Inventory was used to characterize soil properties (Forest Service 1979).

The Oatman series consists of very deep, well-drained soils on plateaus and hillslopes. These soils formed in colluvium and residuum derived dominantly from andesite and volcanic ash (SCS 1993). The Otwin series consists of moderately deep, well-drained soils that formed in colluvium and residuum weathered from andesite and volcanic ash. Otwin soils are found on plateaus. The Hoxie series consists of deep, poorly drained soils that formed in lacustrine material with an influence of volcanic ash in the surface. Hoxie soils are in flat basins. The Hoxie soils are in Buck Lake and were avoided by incorporating the Clover Creek Road Alternative into the preferred alignment (see Resource Report 10). The mean annual precipitation for this association ranges between 35 and 40 inches. Slopes are 0 to 65 percent.

Woodcock-Pokegema-Royst (s6388)

The Woodcock-Pokegema-Royst soil association is crossed by 2.4 percent of the pipeline route length. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the Pacific Connector pipeline in soils association s6388 is Pokegema-Woodcock, 1 to 12 percent slopes (map unit 147C, 2.52 miles). Three other soil map units (two of the units are steep units of Pokegema and Woodcock soils) are crossed in this association with individual lengths ranging from 0.11 to 0.29 mile. Pokegema soils have a paralithic contact with partially weathered andesite at 40 to 60 inches. This soil map unit is susceptible to soil

compaction and has a reclamation sensitivity rating. The mean annual precipitation for this association ranges from about 20 to 30 inches.

Sheld-Pinehurst-Greystoke-Bly (s656)

This STATSGO soil association occurs in both the Jackson County Soil Survey Area and in the Klamath County Soil Survey Area (crossed by 4.2 percent of the pipeline route length). This mapping unit has a mean annual precipitation range between 25 to 37 inches. The dominant soil mapping units from the Soil Survey of Jackson County Area, Oregon (SCS 1993) crossed by the proposed PCGP Project in soils association s656 are: Bly-Royst complex, 1 to 12 percent slopes (map unit 13C, 3.09 miles); Pinejurst-Greystoke complex, 1 to 12 percent slopes (map unit 145C, 3.47 miles); and Greystoke-Pinehurst complex, 12 to 35 percent slopes (map unit 80E, 1.35 mile). Five other soil map units are crossed in this association with individual lengths ranging from 0.04 to 0.67 mile. Each of the dominant soil map units has large stones, is susceptible to soil compaction, and is rated as having reclamation sensitivity potential. The Royst soil has a lithic contact with andesite at 20 to 40 inches. The Greystoke soil has a paralithic contact with weathered andesite at 40 to 60 inches.

The Greystoke-Pinehurst map unit (80E) has steep slopes. The Bly-Royst complex is listed as prime farmland (farmland of statewide importance). The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon Southern Part (SCS 1985) crossed by the proposed PCGP Project in soils association s656 is Greystoke-Pinehurst complex, 12 to 35 percent slopes (map unit 98E, 0.56 mile).

Two other soil map units are crossed in this association with individual lengths of 0.05 and 0.33 mile. The Greystoke-Pinehurst map unit has steep slopes, potential for water erosion, large stones, susceptibility to soil compaction, and potential for reclamation sensitivity.

Lorella-Deven-Bieber-Adinot (s542)

The Lorella-Deven-Bieber-Adinot soil association is crossed by 0.9 percent of the pipeline route length. The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon, Southern Part (SCS 1985) crossed by the Project in soils association s542 are: Fordney loamy fine sand, 2 to 20 percent slopes (map unit 19C, 0.39 mile); and Woodcock association, south (map unit 82E, 0.36 mile). Seven other soil map units are crossed in this association with individual lengths ranging from 0.02 to 0.25 mile. Each of the dominant soils is susceptible to compaction. Fordney soils are considered as prime farmland, if irrigated. Lorella soils have steep slopes that increase water erosion potential, have large stones, a lithic contact with volcanic tuff at 10 to 20 inches, and are classed as having reclamation sensitivity. Woodcock soils have steep slopes, large stones, and are listed as farmland of statewide importance. Average annual precipitation is 18 to 23 inches.

Tulebasin-Malin-Lather-Capjac (s1150)

The Tulebasin-Malin-Lather-Capiac soil association is crossed by 3.1 percent of the pipeline route length. The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon, Southern Part (SCS 1985) crossed by the proposed PCGP Project in soils association s1150 are: Laki-Henley loams (map unit 40, 1.76 miles); Malin clay loam (map unit 53, 0.95 miles); Zuman silt loam (map unit 91, 0.82 mile); Deter clay loam (map unit 17A, 0.71 mile); and Scherrard

clay loam (map unit 70, 0.52 mile). Ten other soil map units are crossed in this association with individual lengths ranging from 0.01 to 0.50 mile.

Each of the dominant soil map units is susceptible to soil compaction. Henley soils have a duripan (4 to 50 inches thick) at 10 to 20 inches. Scherrard soils have a duripan (4 to 24 inches thick) at 20 to 40 inches. The Laki-Henley, Malin, Zuman, and Scherrard map units have saline/sodic conditions and have reclamation sensitivity. The Laki-Henley, Malin, Zuman, and Scherrard soil map units have water tables from the surface to greater than 6 feet from January through December and are listed as prime farmland (farmland of statewide importance). Deter soils are listed as prime farmland if irrigated. Average annual precipitation is 10 to 14 inches.

Poe-Pit-Malin-Laki-Henley (s6357)

The Poe-Pit-Malin-Laki-Henley soil association is crossed by 1.2 percent of the pipeline route length. The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon, Southern Part (SCS 1985) crossed by the PCGP Project in soils association s6357 are: Henley-Laki loams (map unit 28, 1.11 miles); and Laki loams (map unit 38, 0.53 mile). Six other soil map units are crossed in this association with individual lengths ranging from 0.01 to 0.25 mile. Henley soils have a duripan (4 to 50 inches thick) at 10 to 20 inches. Soils in both map units are saline/sodic, are susceptible to soil compaction, and have reclamation sensitivity potential. Henley soils have a water table at 1 to greater than 6 feet from January through December. Laki soils have a water table at 3 to greater than 6 feet from March through August. Both map units are listed as prime farmland (farmland of statewide importance). The average annual precipitation is 10 to 14 inches.

Fordney-Calimus (s6356)

The Fordney-Calimus soil association is crossed by 8.8 percent of the pipeline route length. The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon Southern Part (SCS 1985) crossed by the PCGP Project in soils association s6356 are: Fordney loamy fine sand, 0 to 2 percent slopes (map unit 19A, 3.21 miles); Modoc fine sandy loam, 0 to 2 percent slopes (map unit 58A, 2.94 miles); Calimus loam, 5 to 15 percent slopes (map unit 7C, 1.52 miles); Fordney loamy fine sand, 2 to 20 percent slopes (map unit 19C, 1.89 miles); Calimus loam 0 to 2 percent slopes (map unit 7A, 1.08 miles); and Lorella very stony loam, 2 to 35 percent slopes (map unit 50E, 0.89 mile). Twenty-eight other soil map units are crossed in this association with individual lengths ranging from 0.02 to 1.08 miles. All of the dominant soil map units are susceptible to soil compaction. Modoc soils have a duripan at 20 to 40 inches. Lorella soils have a lithic contact with volcanic tuff at 10 to 20 inches. Fordney, Modoc, and Lorella soils are classed as having reclamation sensitivity because of their shallow restrictive layer or coarse textures. However, the Fordney, Modoc, and Calimus (0 to 2 percent) soils are listed as prime farmland if irrigated. Calimus, 5 to 15 percent slopes, is listed as prime farmland (farmland of statewide importance). The average annual precipitation is 10 to 14 inches.

Stukel-Salisbury-Lorella-Fiddler-Dehlinger-Capona (s6355)

The Stukel-Salisbury-Lorella-Fiddler-Dehlinger-Capona soil association is crossed by 2.2 percent of the pipeline route length. The dominant soil mapping unit from the Soil Survey of Klamath County, Oregon Southern Part (SCS 1985) crossed by the proposed PCGP Project in

soils association s6355 are: Lorella very stony loam, 2 to 35 percent south slopes (map unit 50E, 3.45 miles); Calimus loam, 5 to 15 percent slopes (map unit 7C, 0.58 mile); and Lorella-Calimus association, steep north slopes (map unit 51E, 0.30 mile). Six other soil map units are crossed in this association with individual lengths ranging from 0.05 to 0.24 mile. Lorella soils have steep slopes, water erosion potential, large stones, a lithic contact with volcanic tuff at 10 to 20 inches, have greater than 40 percent clay in the control section, and are rated as having reclamation sensitivity. Calimus and Lorella soils are susceptible to compaction. Calimus soils are listed as farmland of statewide importance. The average annual precipitation is 10 to 14 inches.

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